MATERIAL SAFETY DATA SHEET

SRM Supplier: National Institute of Standards and Technology
Standard Reference Materials Program
Bldg. 202 Rm. 211
Gaithersburg, Maryland 20899

SRM Number: 1880a
MSDS Number: 1880a
SRM Name: Portland Cement
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MSDS Coordinator: Joylene W.L. Thomas
Phone: (301) 975-6776
ChemTrec: 1-800-424-9300

FAX: (301) 926-4751
E-mail: SRMMSDS@nist.gov

SECTION I. MATERIAL IDENTIFICATION

Material Name: Portland Cement

Description: Tricalcium silicate and dicalcium silicate are Portland Cement's essential constituents, along with varying amounts of alumina, tricalcium aluminate and iron oxide as tetracalcium aluminoferrate. Small amounts of magnesia, sodium, potassium, and sulfur are also present. Chromium may be present in the finished cement since the kiln's refractory lining and the steel balls used in the finish-milling operations are possible sources. To improve adhesion, strength, and flexibility, cement may be modified with various plastic latexes.

Other Designations: Hydraulic Cement, Portland Cement Silicate

Chemical Formula: Primarily $3CaO{\cdot}SiO_2$ and $2CaO{\cdot}SiO_2$

CAS Registration: 65997-15-1

DOT Classification: Not hazardous by DOT regulations.

Manufacturer/ Supplier: Available from a number of suppliers.

SECTION II. HAZARDOUS INGREDIENTS

Hazardous Components	Nominal Concentration (%)	Exposure Limits and Toxicity Data *
CaO (calcium oxide)	64	ACGIH TLV-TWA: 10 mg/m^3 (total particulate)
SiO_2 (silicon dioxide)	20	OSHA TLV-TWA: 10 mg/m^3 (total particulate)
Al_2O_3 (aluminum oxide)	5	OSHA TLV-TWA: 5 mg/m^3 (respirable particulate)
Fe_2O_3 (iron III oxide)	3	NIOSH recommended TWA-10h: 10 mg/m^3 (total particulate)
SO_3 (sulfur trioxide)	3	NIOSH recommended TWA-10h: 5 mg/m^3 (respirable particulate)
MgO (magnesium oxide)	2	
K_2O (potassium oxide)	1	No toxicity data documented
TiO_2 (titanium dioxide)	0.2	
Na_2O (sodium monoxide)	0.2	
SrO (strontium oxide)	0.2	
P_2O_5 (phosphoric anhydride)	0.2	
Mn_2O_3 (manganese trioxide)	0.1	
F (fluorine)	0.06	
Cl (chlorine)	0.01	
Cr_2O_3 (chromium trioxide)	0.007	
ZnO (zinc oxide)	0.005	

***** Limits set for the compound as a whole, **NOT** the individual components.

SECTION III. PHYSICAL/ CHEMICAL CHARACTERISTICS

Appearance and Odor: Grey powder with no odor.
Specific Gravity: Not available.
pH: 12 (wet cement)
Solubility in Water: Insoluble.

SECTION IV. FIRE AND EXPLOSION HAZARD DATA

Flash Point: N/A **Method Used:** N/A **Autoignition Temperature:** N/A

Flammability Limits in Air (Volume %): UPPER: N/A
LOWER: N/A

Unusual Fire and Explosion Hazards: None reported.

Extinguishing Media: This material in noncombustible. Use extinguishing media that is appropriate to the surrounding fire.

Special Fire Procedures: Since the fire may produce toxic fumes, wear a self-contained breathing apparatus (SCBA) with a full facepiece operated in the pressure-demand or positive-pressure mode.

SECTION V. REACTIVITY DATA

Stability: **X** **Stable** ____ **Unstable**

Conditions to Avoid: Avoid moisture.

Incompatibility (Materials to Avoid): No hazardous incompatibilities are reported.

Hazardous Decomposition or Byproducts: Calcium hydroxide forms when water is added to Portland Cement; this is an alkaline, abrasive, and *hygroscopic* (moisture-absorbing) material.

Hazardous Polymerization: _____ **Will Occur** **X** **Will Not Occur**

SECTION VI. HEALTH HAZARD DATA

Route of Entry: **X** **Inhalation** **X** **Skin** **X** **Ingestion**

Health Hazards (Acute and Chronic): Portland Cement is a nuisance dust and an irritant to the skin, eyes, and mucous membranes. Its principle health hazard occurs from the formation of alkaline calcium hydroxide (forming from the addition of water to Portland Cement); this material is abrasive and can burn the skin. Dry cement will not cause alkaline burns. Some individuals appear to tolerate brief skin contact with wet cement, but others develop extensive skin burns. Repeated or prolonged skin contact can cause dermititis, including skin dryness, *fissures* (cracks in the skin), eczmatous rashes, and *dystrophy* (a condition caused by defective nutrition) of the nails. Extensive burns with dermal necrosis can occur. Allergic dermatitis may result from the presence of heavy metals, such as chromium, in the mixture.

Splashes into the eyes can cause corneal edema. Ingestion of the powder may cause burns to the esophagus and stomach. Chronic bronchitis may result from long term exposure.

Signs and Symptoms of Exposure: Inhalation symptoms include eye, nose, and upper respiratory tract irritation, cough, expectoration, shortness of breath, and wheezing. Within (12 to 48) h after (1 to 6) h exposures, first, second, and/or third degree burns may occur. There may be no obvious pain at the time of exposure. Allergic reactions are also a sign of exposure.

Medical Conditions Generally Aggravated by Exposure: Individuals with a sensitivity to hexachromium salts should avoid exposure. Individuals with chronic respiratory disorders or skin diseases should minimize exposure.

Listed as a Carcinogen/Potential Carcinogen:

	Yes	No
In the National Toxicology Program (NTP) Report on Carcinogens		X
In the International Agency for Research on Cancer (IARC) Monographs		X
By the Occupational Safety and Health Administration (OSHA)		X

EMERGENCY AND FIRST AID PROCEDURES:

Skin Contact: Remove contaminated shoes and clothing. Rinse affected area with large amounts of water followed by washing the area with soap and water. Obtain medical assistance if necessary.

Eye Contact: Immediately flush eyes, including under the eyelids, with copious amounts of water until victim is transported to an emergency medical facility. **Contact a physician immediately! This material can cause *corneal edema!***

Inhalation: If inhaled, remove the victim to fresh air. If breathing is difficult, give oxygen; if victim is not breathing, give artificial respiration. Obtain medical assistance if necessary.

Ingestion: Never give anything by mouth to an unconscious or convulsing person. If ingested, have the conscious victim drink 120 mL to 240 mL (4 oz to 8 oz) of milk or water. Contact a physician immediately.

TARGET ORGAN(S) OF ATTACK: Upper respiratory tract, skin, digestive tract, and eyes.

SECTION VII. PRECAUTIONS FOR SAFE HANDLING AND USE

Steps to be Taken in Case Material is Released or Spilled: Notify safety personnel of large leaks. Provide adequate ventilation. Cleanup personnel must be protected against dust inhalation and direct contact with the wet cement. Avoid creating airborne dust conditions. Cleanup methods such as vacuuming (with an appropriate filter) or wet mopping minimizes dust dispersion. Carefully scoop up spilled dry material into a suitable container (with secure lid) for disposal or reclamation.

Waste Disposal: Contact your local, licensed contractor for detailed recommendations. Follow all federal, state and local regulations.

Handling and Storage: Those handling Portland Cement should wear protective eyeglasses or chemical safety goggles, per OSHA eye and face protection regulations. Wear other protective clothing such as gloves, boots, and aprons to prevent skin contact. Wear a NIOSH approved respirator for prolonged exposure or exposures above the TLV.

Warning: *Air-purifying* respirators will not protect workers in an oxygen-deficient atmosphere.

NOTE: Contact lenses pose a special problem; soft lenses may absorb irritants, and all lenses concentrate them. **DO NOT** wear contact lenses in the lab.

Provide general and local ventilation systems to maintain airborne concentrations below the OSHA PELs and ACGIH TLV. Local exhaust ventilation is preferred since it prevents contaminant dispersion into the work area by controlling it at its source. Store in tightly closed containers in a cool, dry, well-ventilated area. Protect containers from physical damage.

SECTION VIII. SOURCE DATA/ OTHER COMMENTS

Sources: MDL Information Systems, Inc., MSDS *Portland Cement*, December 9, 1997.

Disclaimer: Physical and chemical data contained in this MSDS are provided for use in assessing the hazardous nature of the material. The MSDS was prepared carefully, using current references; however, NIST does not certify the data on the MSDS. The certified values for this material are given only on the NIST Certificate of Analysis.